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Serum iron level, ferritin and total iron binding capacity level among nonpregnant women with and without melasma

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Background: Melasma is a common acquired disorder characterized by symmetric, hyperpigmented patches with an irregular outline, occurring most commonly on the face. It is most prevalent among young to middle-aged women. Although iron overload affects skin pigmentation, effect of iron deficiency on skin is not clear. So, we evaluated serum iron level, ferritin and total iron binding capacity (TIBC) level among nonpregnant women with and without melasma. **Materials and Methods:** A cross-sectional case study was conducted in 2012 at university dermatologic department on 33 nonpregnant women with melasma (case) and 33 nonpregnant women without melasma (control). Serum iron level, TIBC and ferritin in the two groups was measured and compared. **Results:** Serum iron level was lower in the case group (85 ± 11) in comparison with control group (102 ± 9), but the difference was not significant ($P: 0.9$). Mean TIBC and Ferritin were higher in the case group (TIBC: 329.4 ± 29 , ferritin: 6 ± 18) than the control group (TIBC: 329.3 ± 29 , ferritin: 33 ± 6) without significant difference. **Conclusion:** Although the serum iron level was lower in nonpregnant women with melasma, it was not significant compared with those without melasma.

Key words: Ferritin, melasma, serum iron level, total iron binding capacity

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INTRODUCTION

Melasma is a tan or dark skin discoloration mostly involves face and neck. Although it can affect any one, it is more common in women, especially pregnant women and those who are taking contraceptives or hormone replacement therapy. Melasma is thought to be the stimulation of melanocytes to produce more melanin pigments when there is sun exposure. Genetic predisposition is also an important factor in determining whether someone will develop melasma. Prevalence of melasma increases in patients with thyroid disease.^[1-4] Melasma symptoms are dark, irregular well demarcated hyper pigmented macules to patches commonly found on the upper cheek, nose, lips and forehead.^[3,4] When the skin is exposed to the sun the hyperpigmentation becomes darker which shows the effect of sun exposure in melasma pathophysiology.^[4]

Hemochromatosis is an iron overload disease, originating from a metabolic disorder. It's most common presentation is cirrhosis, hypopituitarism, cardiomyopathy, diabetes, arthritis or hyper pigmentation, which worsens by sun exposure. Both melasma and hemochromatosis have

hyperpigmentation all over the body, but melasma mostly involves places, which are exposed to the sun more frequently.^[5] Melasma is the most common reason of skin hyperpigmentation, which its treatments are often ineffective as it comes back with continued exposure to the sun.^[2,6,7] Iron, cobalt, Magnesium and selenium, Vitamin E and C are known to have effect on skin diseases progress,^[8] but little data about serum iron level and melasma. Although iron overload affects skin pigmentation, effect of iron deficiency on skin is not clear. Hence, we evaluated serum iron level, ferritin and total iron binding capacity (TIBC) level among nonpregnant women with and without melasma.

MATERIALS AND METHODS

In a cross-sectional case-control study performed in 2012 in university referral dermatologic clinic of Rasoul Akram and Razi Hospitals. We included patients who have melasma as a case group. Women with the history of cardiac or thyroid disease and usage of hormone therapy, phototoxic drugs or anti convulsant drugs or pregnancy were not included. Nonpregnant women without melasma were considered as the control group.

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After declaring sufficient information, a written consent was taken from all participants. Control and case groups were matched for demographic variables (age, marital status, body mass index and known related melasma disorder).

The checklist included three parts to collect data regarding demographic information, medical history, and medical examination. Both the interview and medical examination was done by a dermatologist. Melasma diagnosis was made based on clinical examination.^[13] We also checked serum iron level, TIBC and Ferritin level of blood in both groups. We considered serum iron level 55-160 µg/dL, ferritin 11-306 ng/dL and TIBC 228-428 µg/dL as normal amounts among our patients.^[9]

Data were analyzed by Statistical Package for the Social Sciences (SPSS) for Windows (version 16.0; Chicago, IL, USA). Means were compared using independent *t*-test and proportions were compared using Chi-square test. Crude and adjusted odds ratios were calculated along with 95% confidence intervals.

The study was approved by Committee of Ethics in Iran University of medical sciences.

RESULTS

Thirty-three nonpregnant women with melasma (case) and 33 nonpregnant women without melasma were evaluated during 1-year study. Results regarding the demographic variable have been shown in Table 1. Control and case groups were matched for demographic variables (age, marital status, body mass index and known related melasma disorder).

Mean (standard deviation) serum iron level, TIBC and ferritin is shown in Table 2.

In case group, 27% had a lower level of serum iron, and 10% had upper serum iron level. In the control group, 15% were in the lower level and 10% upper level of serum iron ($P > 0.05$). About 23% of patients in the case group had low Ferritin level compared with 12% in the control group, but not statistically significant.

DISCUSSION

The mean serum iron level in the case group was a lower than the control group. We did not find a considerable relationship between serum iron level amount and melasma. However, Ping *et al.* found higher amounts of iron, magnesium, copper, and zinc among 46 nonpregnant women with melasma.^[10] However Jie *et al.* showed higher iron and copper in women with melasma comparing with women without melasma.^[11] We could not find any reason

Table 1: Demographic information compared between case and control groups

Demographic data	Case group (n = 33)	Control group (n = 33)	P
Age	33.18 (6.1)	32.22 (6.2)	>0.05
Marital status (married)	25 (75.7)	28 (77.7)	>0.05
Known melasma related disease*	0 (0)	0 (0)	>0.05

*Specific endocrinologic diseases. The results are presented as mean \pm SD or n (%) where appropriate. Independent *t*-test and Chi-square were used for statistical analysis. $P < 0.05$ was considered significant. SD = Standard deviation

Table 2: Comparison of measured variables among case and control groups

Variables	Group	Mean	SD	P*
TIBC	Case	329.48	79.099	0.9
	Control	329.38	117.82	
Serum iron level	Case	85.42	42.17	0.5
	Control	102.02	25	
Ferritin level	Case	46.71	34.81	0.1
	Control	38.8	19.68	

**t*-test. SD = Standard deviation; TIBC = Total iron binding capacity

for this difference. Study with larger sample size may be suggested.

In our study, melasma was more observed in the age 25-35 years old. Melasma is a common acquired disorder characterized by symmetric, hyperpigmented patches, which are most prevalent among young to middle-aged women.

We did not find any significant difference between case and control groups in TIBC and Ferritin between two groups. The prevalence of low iron serum was more in case group (27%) compared with the control group (15%). In a research conducted in 2012, 14.3% of patients with melasma also had low serum iron level.^[12]

Melasma is an important cosmetic problem worldwide. There are different factors that have an effect on melasma. Considering the common dermatologic symptoms of iron overload disease (hemochromatosis) and the relationship between iron deficiency and melasma.

CONCLUSION

Although the serum iron level was lower in nonpregnant women with melasma, it was not significant compared with those without melasma. Considering iron deficiency anemia as a prevalent problem among young women and as the fact that there are not definite treatments for melasma, we may suggest adding iron minerals in the treatment of melasma. Furthermore, there is a need for further evaluations with larger sample sizes regarding this issue.

One limitation of our study was that we did not consider family history of melasma in our demographic data

among our groups, which are an important predisposing factor.

AUTHOR'S CONTRIBUTION

EB contributed in the conception of the work, conducting the study, revising the draft, approval of the final version of the manuscript, and agreed for all aspects of the work FB contributed in the conception of the work, conducting the study, revising the draft, approval of the final version of the manuscript, and agreed for all aspects of the work SE contributed in the conception of the work, revising the draft, approval of the final version of the manuscript, and agreed for all aspects of the work KH contributed in the conception of the work, revising the draft, approval of the final version of the manuscript, and agreed for all aspects of the work AG contributed in the design of the work, revising the draft, approval of the final version of the manuscript, and agreed for all aspects of the work ZAC contributed in the conception of the work, conducting the study, revising the draft, approval of the final version of the manuscript, and agreed for all aspects of the work

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